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NOTES ON GEOGRAPHIC DISTRIBUTION

New country records for five species of *Pristimantis* Jiménez de la Espada, 1870 from Ecuador

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ABSTRACT: Five new species of frogs from the genus *Pristimantis* are reported for Ecuador, thus extending the distribution range for these species, previously described only for the southern Andes of Colombia and the northern Andes of Peru. The diversity of *Pristimantis* in Ecuador increases to 148 species, adding five additional species to the total of 508 anurans already described for Ecuador.

Terrarana represents 28% of the amphibians in the Neotropics and close to 13% of the amphibians known worldwide (Hedges *et al*. 2008). Within this group, *Pristimantis* Jimenez de la Espada, is a remarkable taxon in terms of diversity and taxonomy. In Ecuador, for example, *Pristimantis* species account for almost one fourth of the amphibian diversity and are considered a very important component of the ecosystems where they occur, especially in the Andean region (AmphibiaWeb 2011; Lynch and Duellman 1997). This region still contains many areas that have been poorly studied and, as exploration increases, so does the number of new species found (Terán-Valdéz and Guyasamín 2010; Reyes-Puig *et al*. 2010; Yánez-Muñoz *et al*. 2010a, b; Lehr and Coloma 2008).

Here we report five new species of *Pristimantis* for Ecuador. They were found in recent expeditions and also in national herpetological collections. We examined specimens of the Zoology Museum of the Pontificia Universidad Católica del Ecuador (QCAZ) and the Herpetological Division of the Ecuadorian Museum of Natural Science (DHMECN). Identification of specimens follows the classification proposed by Hedges *et al*. (2008). For features terminology we used Lynch and Duellman (1997), and for vegetation classification we followed Valencia *et al*. (1999). This research was conducted under collection permit No. 021–08 IC-FAU-DNBAPVS/MA and Nº 010–IC-FAU-DNBAP/MA issued by Ecuadorian Ministerio del Ambiente.

***Pristimantis colonensis* (Mueses-Cisneros, 2007).** This species was reported for five Colombian localities at Valle de Sibundoy in the municipalities of Colón, San Francisco, and Sibundoy, at elevations of 2200-2700 m (Mueses-Cisneros 2007). We report *P. colonensis* in four localities of Ecuador: Provincia Sucumbíos: Campamento Alto La Bonita (00°29'18.0 N, 77°35'12" W, 2600 m), DHMECN 06418-06440; El Playón (00°38.49'N, 77°37.192' W, 2800 m), QCAZ 14541; Santa Bárbara (00°38'37.1" N, 77°31'56.3" W, 2586 m) QCAZ 50030 and Provincia Napo: Cordillera de los Guacamayos, (00°37'26.5" S, 77°50'27.1" W, 2294 m), QCAZ 10799 (Figures 1 and 3). All localities correspond to areas of Evergreen High Montane Forest (Valencia *et al*. 1999).

Pristimantis colonensis can be easily distinguished from similar species by the presence of prominent paravertebral folds, color pattern (with narrow irregular bands on flanks, groin, thighs and shanks), and the fifth toe longer than third but not extending to distal subarticular tubercle of fourth toe (condition "B" of Lynch and Duellman 1997; Mueses-Cisneros 2007).

The original description (Mueses-Cisneros 2007) states that this species could be found in Ecuador because of the proximity to the type locality. Edgar Lehr checked six specimens from Ecuador assignable to *P. colonensis*; however, Mueses-Cisneros (2007) did not examine the material and Lehr did not confirm the specimens'identity. Our report is the first for Ecuador, increasing the geographic range to 227 Km south of the type locality.

Pristimantis muscosus (Duellman and Pramuk, 1999). This species was previously reported only with specimens from the type locality at the Eastern side of Abra Pardo Miguel, Peru (Duellman and Leher 2009). Here, we report *P. muscosus* from Provincia de Zamora Chinchipe: Reserva Biológica Tapichalaca (04°28' S, 79°08' W, 2500 m), DHMECN 2518-19, 2521 and 8117 (Figure 1 and 3). This locality corresponds to Montane Cloud Forest (Valencia *et al.* 1999).

Pristimantis muscosus can be distinguished from similar species by the pale vermiculations on the dorsum, long snout, bluntly rounded in dorsal view and rounded in profile, upper eyelid with one or two posterior round tubercles, absence of cranial crest and low diffuse ulnar tubercles (Duellman and Pramuk 1999). This description

was based on four females. Here we report the first known male of the species (Figure 2). This species exhibits sexual dimorphism as evidenced by a darker ventral pattern with white-cream spots in the males, and variation among sexes in the coloration of the iris (Figure 1). *P. muscosus*, is apparently related to *P. spinosus* (Lynch 1979) from the Eastern slope of Southern Andes Ecuador, as suggested by similarities in their external morphology. However, all our specimens differ from *P. spinosus* by the absence of elongated tubercles in the upper eyelid and the ulnar subconic tubercles .

According to Frost (2011), the distribution of this species extends from the Eastern side of the Cordillera del Cóndor in Ecuador to adjacent locations in Peru, although reports from Ecuador needed specific confirmation (Duellman and Lehr, 2009). In this account we present the first confirmed report for Ecuador, which extends the geographic distribution range 216 km northwest of the type locality, and expands the altitudinal distribution to 2500 m.

Pristimantis rhodostichus (Duellman and Pramuk, 1999). This species was previously known only from its type locality, the road from Abra Pardo Miguel to Moyobamba, in the Northeastern side of Cordillera Central de Perú (Duellman and Leher 2009). We report *P. rhodostichus* from Provincia de Zamora Chinchipe: Cordillera del Cóndor (03°44'45.6" S, 78°32'13.7" W, 1400 m) DHMECN 8453-54 and 8502; Provincia de Loja: Estación Científica San Francisco (03°58'00.0" S, 79°04'00.1" W, 1920) QCAZ31209-12, 31216-17 (Figures 1 and 3). These localities are part of Evergreen Low Montane Forest (Valencia *et al.* 1999).

Pristimantis rhodostichus can be distinguished from similar species by having a subacuminate snout in dorsal view and inclined posteroventrally in profile, heel lacking tubercles, dorsum with brow markings, tan-colored venter with fine dark brown flecks and tan-colored posterior surfaces of thighs (Duellman 1990, Duellman and Pramuk 1999).

Duellman and Leher (2009) suggested that previous Ecuadorian reports at Curintza, Zamora Chinchipe Province must be confirmed. Here, we report the first confirmed specimens of the species in Ecuador, extending the geographic distribution range 347 km northwest of the type locality, and increasing the altitude distribution to 1920 m.

Pristimantis schultei (Duellman, 1990). This species was previously known from North of Cordillera Central, between 2004–2870 m, and from a place at and elevation of 2500 m on the eastern side of Cordillera Occidental in northern Peru (Duellman and Lehr 2009). Here, we report *P. schultei* at two localities: Provincia de Zamora Chinchipe: Reserva Biológica Tapichalaca (04°28' S, 79°08' W, 2500 m), DHMECN 8086-8092; Provincia de Cañar: San Antonio de Jubal (2°32'16.1" S, 78°33'14.5" W, 2233 m), QCAZ 51551; (Figure 1 and 3). These localities correspond to Montane Cloud Forest (Valencia *et al.* 1999).

Pristimantis schultei can be distinguished from similar species by the snout subacuminate in dorsal view and inclines posterioventrally in profile; SVL in males 23.5-26.6 mm, in females 28.4-34.0 mm; lacking yellow spots on the posterior surface of the thigh and distinct conical tubercles on the eyelid (Duellman 1990, Duellman and Pramuk 1999).

Duellman and Lehr (2009) suggested that reports in Ecuador need to be confirmed. Our reports are the first confirmed vouchers for Ecuador and extend the geographical range to 421 km northwest of the type locality.

Pristimantis sternothylax (Duellman and Wild, 1993). This species was previously known from elevations of 1735–1840 m in Humid Montane Forest on the western slope of Cordillera de Huancabamba, in northern Peru; also recorded from Cordillera Occidental at Chota (Departamento de Cajamarca) and Cerro Aypate and Toronche, Departamento de Piura, Peru (Duellman and Leher 2009). Here, we report *P. sternothylax* from Provincia de Loja: Reserva Biológica Utuana (04°22'02" S, 79°42'02" W, 2000 m), DHMECN 4527-4531 and 4538 m (Figures 1 and 3). The locality where *P. sternothylax* was found, at elevations between 1500 and 2900m, is classified as Montane Cloud Forest (Valencia *et al.* 1999).

Pristimantis sternothylax can be distinguished from similar species by having an acuminate snout, low tubercles on the upper eyelid and tubercles absent on the heel, distinct and round tympanum, skin on dorsum shagreened with few, low, round tubercles usually most evident posteriorly and laterally; longitudinal or diagonal dorsolateral marks on the limbs (Duellman and Wild 1993, Duellman and Pramuk 1999).

These records are the first confirmed specimens of this species in Ecuador and increase the geographic distribution 113 km North of the type locality.

The geographic range extensions presented in this paper connect the former known distribution for these species to the South in the Andes of Colombia and to the North in Andes of Peru. Previously described endemic species from Huancabamba and Eastern sides of the Peruvian Andes such as *Pristimantis anemerus* and *P. rufioculis*, could follow the same distribution patterns of the species mentioned here. However, currently there are no specimens in Ecuadorian collections to confirm this.

This report increases to 148 the number of direct-development frogs of the genus *Pristimantis* in Ecuador, and to 508 the total number of amphibian species in the country (AmphibiaWeb 2011). The ongoing increase in the number of amphibian species reported for Ecuador is the result of renewed collaboration and synergies among several researchers and academic institutions in the country.

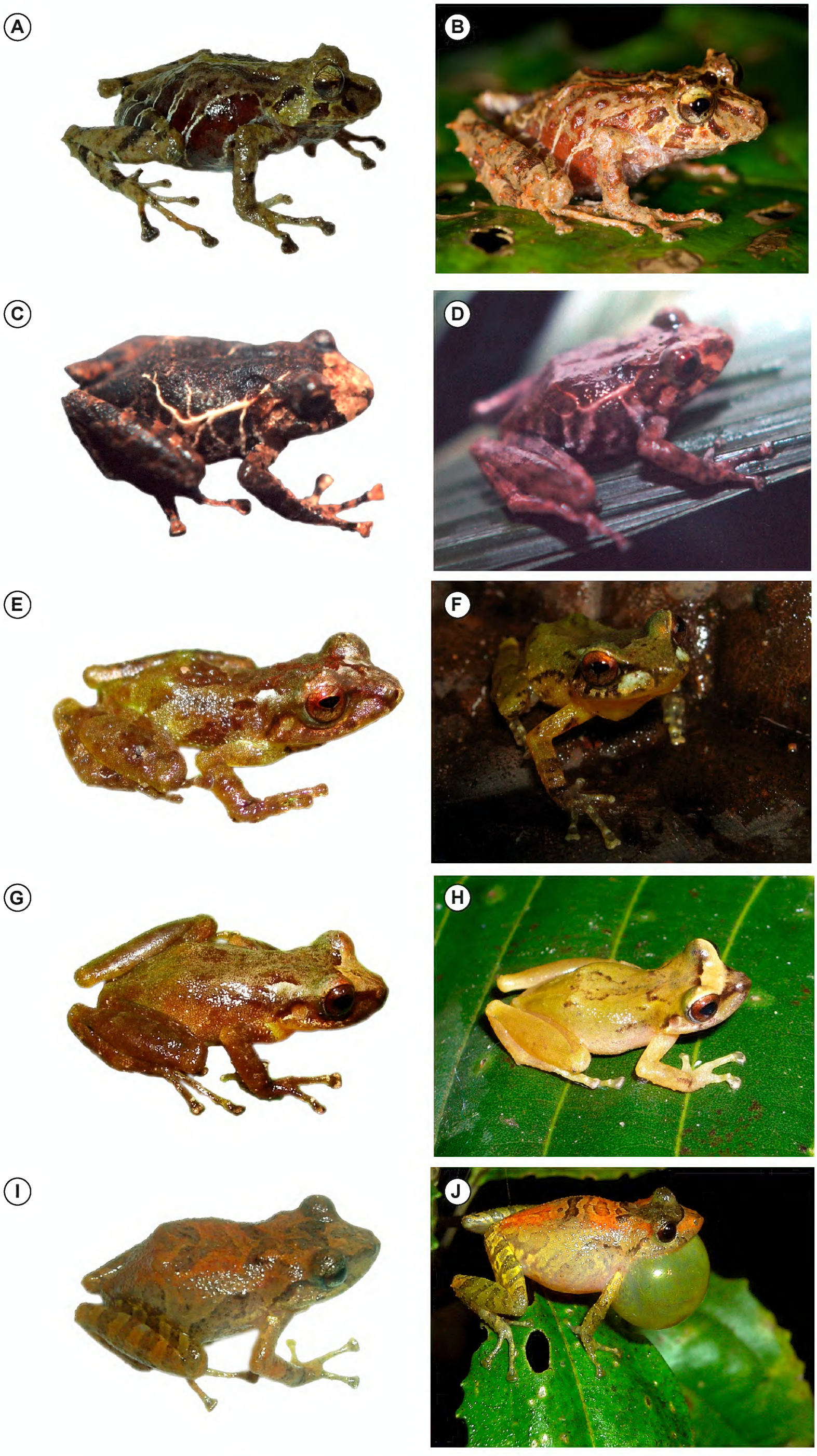

Figure 1. New records of direct-developing frogs *Pristimantis* in Ecuador. *Pristimantis muscosus*: A) ♀ DHMECN 2519 LRC: 28.9 mm and B) ♂ DHMECN 2518 LRC: 25.8 mm; P. rhodostichus: C) juvenil DHMECN 8502 LRC: 12.9 mm and D) ♂ DHMECN 8453 LRC: 21.3 mm; P. schultei: G) ♂ DHMECN 8091 LRC: 23.1 mm and H) ♂ QCAZ 51551 LRC: 24.48 mm; P. sternothylax: I) ♂ DHMECN 4529 LRC: 21.8 mm and J) ♂ DHMECN 4527 LRC: 21.3 mm.

FIGURE 2. Dorsal and ventral views of adult *Pristimantis muscosus* showing variation in dorsal and ventral patterns. From left to right: A) DHMECN 2519, B) DHMECN 2518, C) DHMECN 2521 (See Appendix I for locality data).

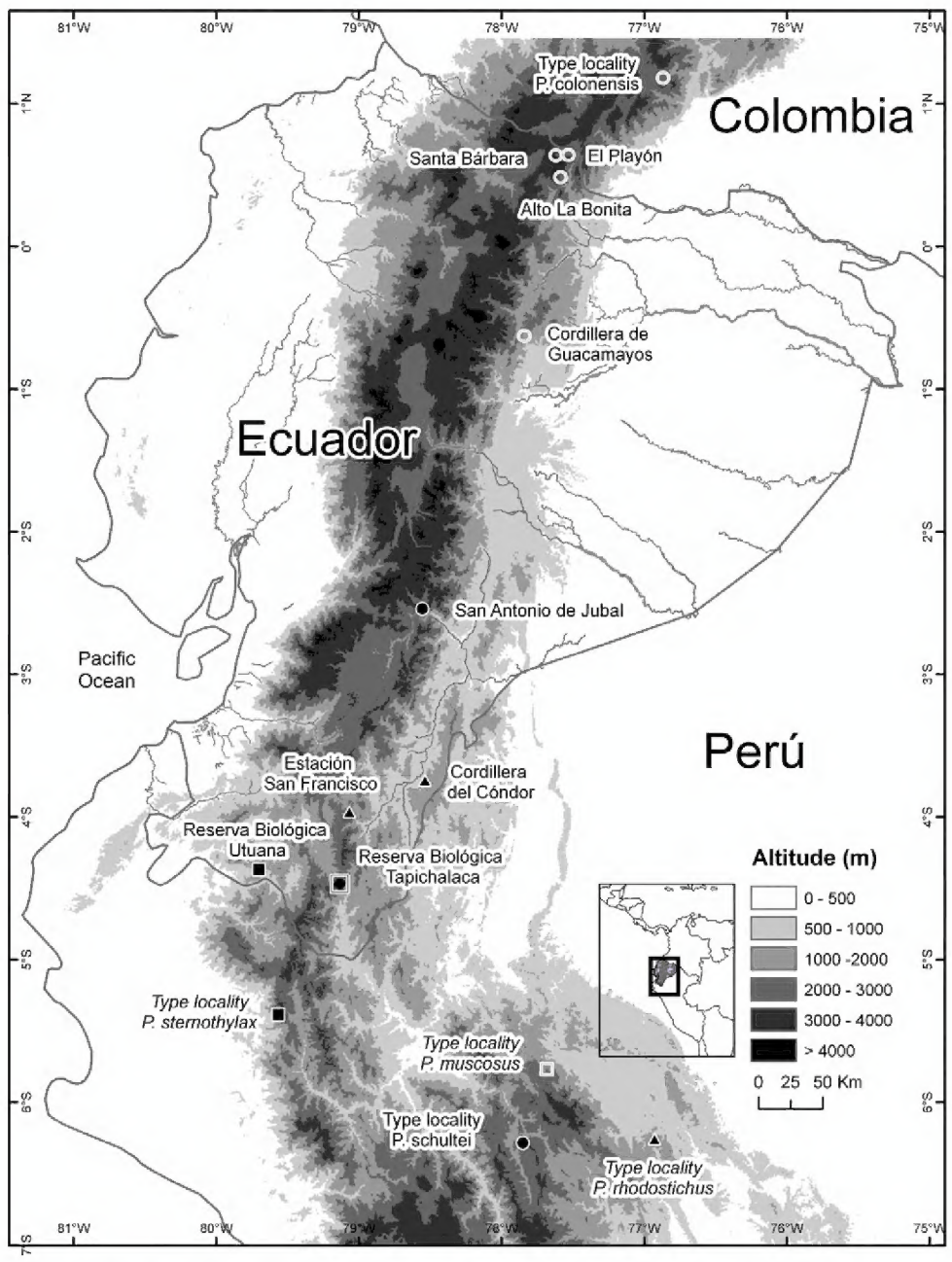

FIGURE 3. Records of *Pristimantis colonensis* (hollow circles), *P. muscosus* (hollow squares), *P. rhodostichus* (triangles), *P. schultei* (black-filled circles) and *P. sternothylax* (black-filled squares). Locality data from Duellman and Lehr 2009 and specimens deposited at the Museo de Zoología of Pontificia Universidad Católica del Ecuador, Museo Ecuatoriano de Ciencias Naturales (Appendix 1).

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Appendix 1. Localities and examined specimens of *Pristimantis* spp.

SPECIES	COORDINATES	ELEVATION (M)	COUNTRY	PROVINCE/ DPTO.	LOCALITY	REFERENCE
P. colonensis	01°11'N 76°52' W	2400	Colombia	Putumayo	Valle Sibundoy	Mueses-Cisneros 2007
	00°29'18.0" N 77°35'12" W	2600	Ecuador	Sucumbíos	Alto La Bonita	DHMECN 06418-06440
	00°38'49" N 77°37'19.2" W	2800	Ecuador	Sucumbíos	El Playón	QCAZ 14541, 14545-46
	00°38'37.1" N 77°31'56.3" W	2800	Ecuador	Sucumbíos	Santa Bárbara	QCAZ50030, 46590
	00°37'26.5" S 77°50'27.1" W	2294	Ecuador	Napo	Cordillera de Guacamayos	QCAZ 10799, 50262-63, 50267, 50271-72, 50277, 50282
P. muscosus	05°46' S 77°41' W	1800	Peru	San Martín	eastern slope of the Abra Pardo Miguel	Duellman and Pramuk 1999
	04°28' S 79°08' W	2500	Ecuador	Zamora Chinchipe	Reserva Biológica Tapichalaca	DHMECN 2518-19, 2521, 8117
P. rhodostichus	06°15'33.8" S 76°55'31.5" W	1080	Peru	Amazonas	road to Abra Pardo Miguel, Moyobamba eastern slope of the Cordillera Central norte de Perú	Duellman and Pramuk 1999
	03°58'00.0" 79°04'00.1" W	1920	Ecuador	Loja	Estación Científica San Francisco	QCAZ31209-12, 31216-17
	03°44'45.6" S 78°32'13.7" W	1400	Ecuador	Zamora Chinchipev	Cordillera del Cóndor	DHMECN 8453, 8454, 8502
P. schultei	06°17' S 77°51' W,	2850	Peru	Amazonas	5 km N Levanto	Duellman 1990
	04°28' S 79°08' W	2500	Ecuador	Zamora Chinchipe	Reserva Biológica Tapichalaca	DHMECN8086-8092
	02°32'16.1" 78°33'14.5" W	2233	Ecuador	Cañar	San Antonio de Jubal	QCAZ51551
P. sternothylax	05°23' S 79°34' W	1840	Peru	Piura	western slope of the Cordillera de Huancabamba	Duellman and Wild 1996
	04°22'02" S 79°42'02" W	2200	Ecuador	Loja	Reserva Biológica Utuana	DHMECN4527-4531, 4538